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MATHEMATICS 9

Student Support Guide

"B" Pack

Please combine the second half of the Student Support Guide with the "A" Pack you already have.

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Section 1: Pretest

1. a. $a+6=15$
$a=9$

b. $b-4=-4$
$b=0$

c. $5b=30$
$b=6$

d. $3b=-24$
$b=-8$

e. $4m+1=17$
$m=4$

f. $3s+5=2s-1$
$s=-6$

2. a. $x+5>2$
$x>-3$

b. $x-3<8$
$x<11$

c. $3x<21$
$x<7$

d. $2x>16$
$x>8$

3. a. $x+3=10$
$-3 \quad -3$
$x=7$

b. $y-4=8$
$+4 \quad +4$
$y=12$

c. $y-2=-5$
$+2 \quad +2$
$y=-3$

d. $3a=18$
$\frac{1}{3}\times 3a=\frac{1}{3}\times 18^{6}$
$a=6$

e. $-a=5$
$a=-5$

f. $-2a=14$
$2a=-14$
$\frac{1}{2}\times 2a=\frac{1}{2}\times(-14)$
$\frac{1}{2}\times 2a=-\left(\frac{1}{2}\times 14^{7}\right)$
$a=-7$

g. $\frac{x}{3}=8$
$\frac{1}{3}\times\frac{x}{3}=3\times 8$
$x=24$

h. $\frac{x}{2}=\frac{3}{5}$
$5x=6$
$\frac{1}{5}\times 5x=\frac{1}{5}\times 6$
$x=\frac{6}{5}$ or $1\frac{1}{5}$

i. $3a+2a=15$
$5a=15$
$\frac{1}{5}\times 5a=\frac{1}{5}\times 15^{3}$
$a=3$

j. $4a-a=18$
$3a=18$
$\frac{1}{3}\times 3a=\frac{1}{3}\times 18^{6}$
$a=6$

k. $2(m+5)=8$
$2m+10=8$
$-10 \quad -10$
$2m=-2$
$\frac{1}{2}\times 2m=\frac{1}{2}\times(-2)$
$\frac{1}{2}\times 2m=-\left(\frac{1}{2}\times 2^{1}\right)$
$m=-1$

l. $3(r-1)=6$
$3r-3=6$
$+3 \quad +3$
$3r=9$
$\frac{1}{3}\times 3r=\frac{1}{3}\times 9^{3}$
$r=3$

m. $3a + 2 = 5a$

$-2 \quad -2$

$3a = 5a - 2$

$-5a \quad -5a$

$-2a = -2$

$2a = 2$

$\frac{1}{2} \times 2a = \frac{1}{2} \times 2$

$a = 1$

n. $5a - 1 = 2a + 5$

$+1 \quad +1$

$5a = 2a + 6$

$-2a \quad -2a$

$3a = 6$

$\frac{1}{3} \times 3a = \frac{1}{3} \times 6$

$a = 2$

o. $a^2 + 1 = 17$

$-1 \quad -1$

$a^2 = 16$

$a = 4$

p. $3b^2 = 12$

$\frac{1}{3} \times 3b^2 = \frac{1}{3} \times 12$

$b^2 = 4$

$b = 2$

q. $\sqrt{m} - 1 = 3$

$+1 \quad +1$

$\sqrt{m} = 4$

$m = 16$

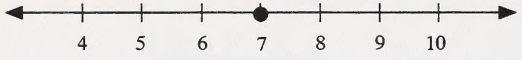
r. $2\sqrt{r} = 6$

$\frac{1}{2} \times 2\sqrt{r} = \frac{1}{2} \times 6$

$\sqrt{r} = 3$

$r = 9$

4. a.



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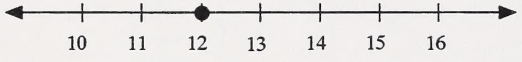

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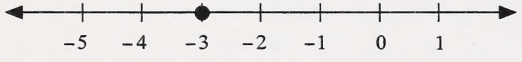

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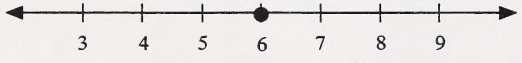

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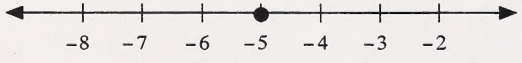

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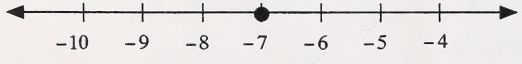

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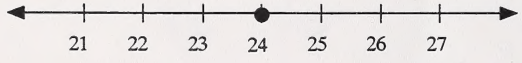

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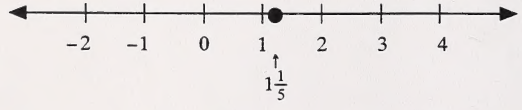

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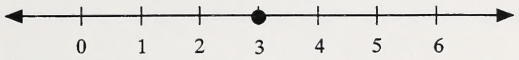

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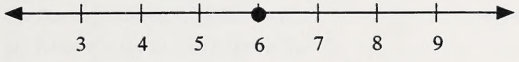

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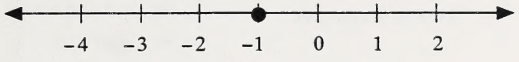

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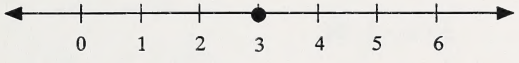

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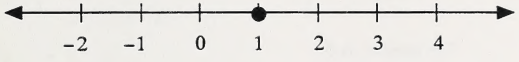

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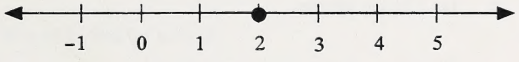

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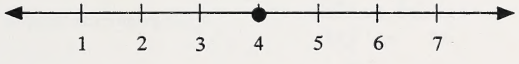

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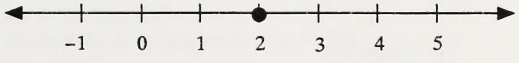

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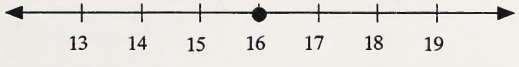

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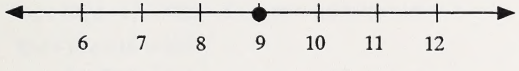


5. a. $a + 8 < 2$

$-8 \quad -8$

$a < -6$

b. $r - 5 > 3$

$+5 \quad +5$

$r > 8$

c. $2b < 10$

$\frac{1}{\cancel{2}} \times \frac{1}{\cancel{2}}b < \frac{1}{\cancel{2}} \times \frac{5}{\cancel{10}}$

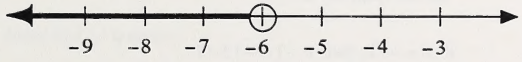
$b < 5$

d. $3m > 15$

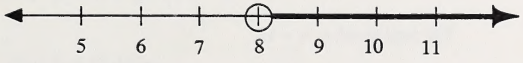
$\frac{1}{\cancel{3}} \times \frac{1}{\cancel{3}}m > \frac{1}{\cancel{3}} \times \frac{5}{\cancel{15}}$

$m > 5$

6. a.



b.



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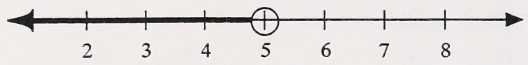
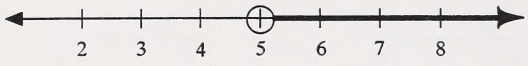


d.



7. a. Let n be the number.

$$\begin{aligned} n - 5 &= 9 \\ +5 &\quad +5 \\ \hline n &= 14 \end{aligned}$$

The number is 14.

b. Let n be the number.

$$3n = 24$$

$$\frac{1}{3} \times 3n = \frac{1}{3} \times 24$$

$$n = 8$$

The number is 8.

c. Let n be the number.

$$\begin{aligned} 5n + 4 &= 19 \\ -4 &\quad -4 \\ \hline 5n &= 15 \end{aligned}$$

$$\frac{1}{5} \times 5n = \frac{1}{5} \times 15$$

$$n = 3$$

The number is 3.

d. Let n be the number.

$$\begin{aligned} 2n - 3 &= n + 5 \\ +3 &\quad +3 \\ \hline 2n &= n + 8 \\ -n &\quad -n \\ \hline n &= 8 \end{aligned}$$

The number is 8.

8. a. Let the amount Ryan spent be r.
Let the amount Lu-Lin spent be $r - 5$.

$$\begin{aligned} r + r - 5 &= 17.96 \\ 2r - 5 &= 17.96 \\ +5 &\quad +5 \\ \hline 2r &= 22.96 \\ r &= 11.48 \end{aligned}$$

Ryan spent \$11.48.

If $r = 11.48$, then $r - 5 = 11.48 - 5$
$= 6.48$

Lu-Lin spent \$6.48.

b. Let the first number be n.
Let the next number be $n + 1$.

$$\begin{aligned} n + n + 1 &= -25 \\ 2n + 1 &= -25 \\ -1 &\quad -1 \\ \hline 2n &= -26 \\ n &= -13 \end{aligned}$$

The first number is -13.

If $n = -13$, then $n + 1 = -13 + 1$
$= -12$

The next number is -12.

9. Methods will vary. An algebraic method is shown, but students do not need to use algebra to solve the problems.

a. Let Zoe's age be z.
Let Jennifer's age be $3z$.
Let Zoe's age six years ago be $z-6$.
Let Jennifer's age six years ago be $3z-6$.

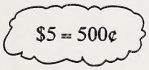
$$\begin{aligned} z-6+3z-6 &= 48 \\ 4z-12 &= 48 \\ +12 \quad & +12 \\ \hline 4z &= 60 \\ \frac{1}{\cancel{4}_{1}} \times \cancel{4}^{1} z &= \frac{1}{\cancel{4}_{1}} \times \cancel{60}^{15} \\ z &= 15 \end{aligned}$$

Zoe is 15 year old.

If $z=15$, then $3z = 3 \times 15$
$= 45$

Jennifer is 45 years old.

b. Let the number of quarters be q.
Let the number of dimes be $q+1$.
Let the value of the quarters in cents be $25q$.
Let the value of the dimes in cents be $10(q+1)$.



$$\begin{aligned} 25q+10(q+1) &= 500 \\ 25q+10q+10 &= 500 \\ 35q+10 &= 500 \\ -10 \quad & -10 \\ \hline 35q &= 490 \\ \frac{1}{\cancel{35}_{1}} \times \cancel{35}^{1} q &= \frac{1}{\cancel{35}_{1}} \times \cancel{490}^{14} \\ q &= 14 \end{aligned}$$

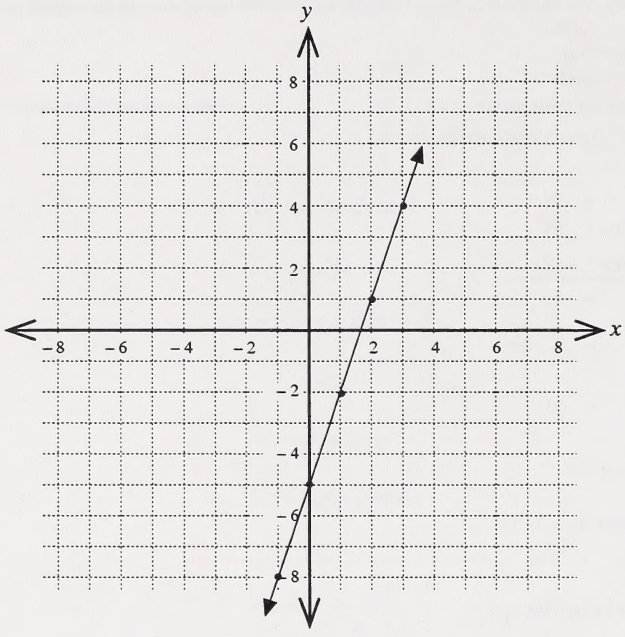
Jamil had 14 quarters.

If $q=14$, then $q+1 = 14+1$
$= 15$

Jamil had 15 dimes.

10. $y = 3x - 5$

x	y
3	4
2	1
1	−2
0	−5
−1	−8



11. a. $y + \cancel{x} = 2$

$\cancel{-x} \quad -x$

$y = -x + 2$

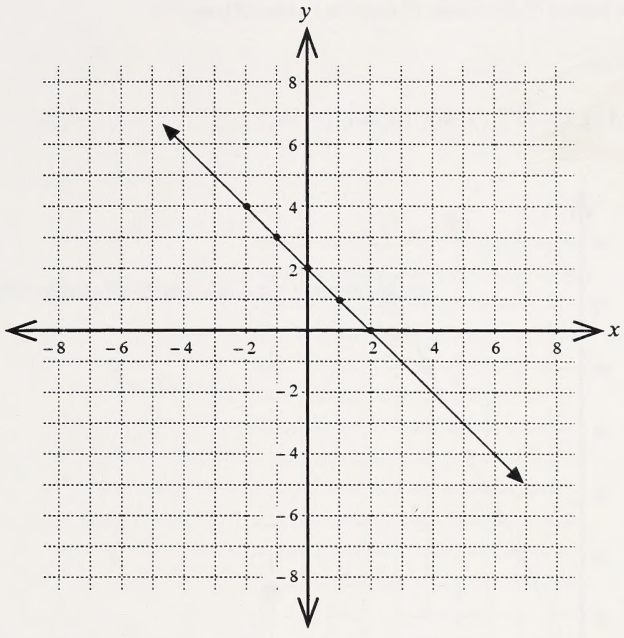
b. $3y = 2x$

$\frac{1}{\cancel{3}} \times \cancel{3}^{1} y = \frac{1}{3} \times 2x$

$y = \frac{2}{3}x$

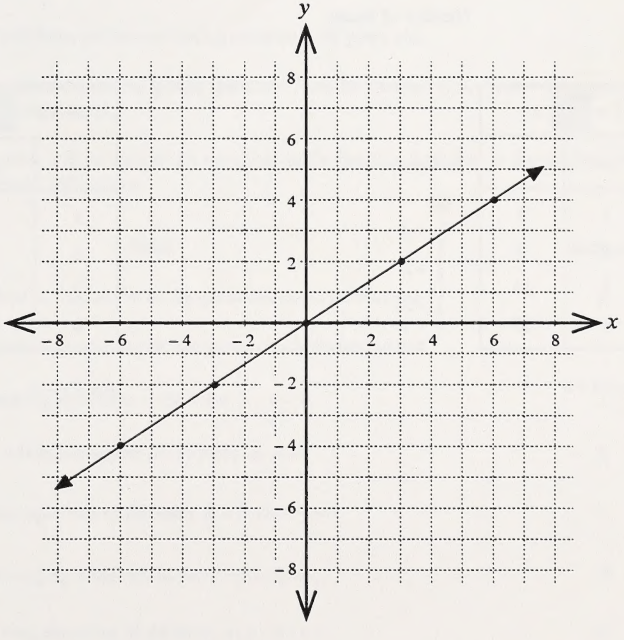
12. a. $y = -x + 2$

x	y
2	0
1	1
0	2
−1	3
−2	4



b. $y = \frac{2}{3}x$

x	y
6	4
3	2
0	0
−3	−2
−6	−4

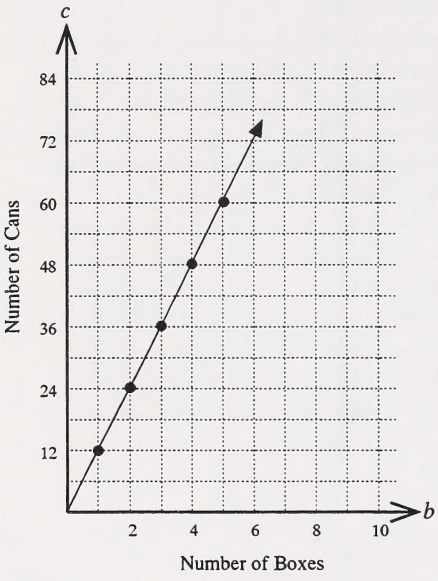


13. a. The number of cans equals 12 times the number of boxes.

b. $c = 12b$

c. $(1,12),\ (2,24),\ (3,36),\ (4,48),\ (5,60)$

d.



14. a.

$b =$ ■ $a + 5$	
a	b
1	7
2	9
3	11
4	13

Pattern: +2, +2, +2

$b = 2a + 5$

b.

$y = 3x -$ ■	
x	y
1	−1
2	2
3	5
4	8

Pattern: +3, +3, +3

$y = 3x - 4$

15. a. $b = \frac{4(220-a)}{5}$

$= \frac{4(220-15)}{5}$

$= \frac{4 \times 205}{5}$

$= \frac{820}{5}$

$= 164$

The maximum number of heartbeats during exercise for 15-year olds is 164 beats per minute.

b. $b = \frac{4(220-a)}{5}$

$144 = \frac{4(220-a)}{5}$

$\frac{\cancel{5}}{\cancel{4}_1} \times \cancel{144}^{36} = \frac{\cancel{5}^1}{\cancel{4}_1} \times \frac{\cancel{4}^1(220-a)}{\cancel{5}_1}$

$180 = 220 - a$

$-220 \quad -220$

$-40 = -a$

$40 = a$

A person with a maximum heartbeat of 144 beats per minute during exercise is 40 years old.

Note: It is recommended that students review the notes and do a few sample questions from the Practice Activities in the sections which correspond to the questions with which they experienced success.

It is recommended that students carefully study the notes and do most of the questions in the Practice Activities in the sections which correspond to the questions with which they experienced difficulties.

Questions	Skills	Sections
1	solving equations by inspection or the guess-check-revise method	2
2	solving inequations by inspection or the guess-check-revise method	3
3.a., b., c.	solving equations of the form $x + a = b$	4
3.d., e., f.	solving equations of the form $ax = b$	6
3.g., h.	solving equations of the form $\frac{x}{a} = b$ and $\frac{x}{a} = \frac{b}{c}$	8
3.i., j.	solving equations of the form $ax + bx = c$	10
3.k., l.	solving equations of the form $a(x + b) = c$	10

Questions	Skills	Sections
3.m., n.	solving equations of the forms $ax + b = cx$ and $ax + b = cx + d$	11
3.o., p.	solving equations of the forms $x^2 + a = b$ and $ax^2 = b$	12
3.q., r.	solving the equations of the forms $\sqrt{x} + a = b$ and $a\sqrt{x} = b$	12
4	graphing equations	1
5.a., b.	solving inequations of the form $x + a < b$ or $x + a > b$	4
5.c., d.	solving inequations of the form $ax < b$ or $ax > b$	6
6	graphing inequations	2
7	solving problems using equations	2, 4, 6, 8, 9
8, 9	solving problems using equations	10, 11, 13
10, 12	graphing equations	14
11	rearranging equations	14
13	describing relations	15
14	writing equations given ordered pairs	15
15	using formulas	15

Module 5: Ratio and Proportion

Gathering Materials

For this module the student will need the following items available from the Learning Resources Distributing Centre.

- Student Module 5: Ratio and Proportion
- Assignment Booklet for Module 5
- optional course audiocassette for Module 5
- required videocassettes for Module 5 (*MATH MOVES: Percents, SOLVE IT: Scale Drawings and Models*)

Students may use the following computer programs if they have access to them and an Apple™ or compatible computer.

- *Computer Drill and Instruction: Mathematics, Level D* (SRA)

In addition, the students will need a binder and loose-leaf paper for their responses, a scientific calculator with a $a\frac{b}{c}$ key, and a geometry set.

Hold the Assignment Booklet for safekeeping until the student is ready for it.

Guiding the Student

Each section of Module 5 deals with a different aspect of ratio and proportion. Parts of Sections 2, 3, 4, 5, 7, 8, and 9 review previously developed skills. The Pretest in Section 1 will help you discover the student's strengths and weaknesses and make a personal study plan.

Ensure that the student reads the welcome pages and the module introduction, and does Section 1. Then check the answers to the Pretest (suggested answers follow). Help the student develop a personal study plan and schedule. An average student spends about seven weeks of a 40-week school year on Module 5.

Discuss the evaluation of Module 5 with the student. The assignment for Module 5 is worth 10% of the student's final grade.

Use the guidelines provided at the beginning of this guide to monitor the student's progress and provide encouragement.

Refer to the suggested answers in the Appendix of Student Module 5: Ratio and Proportion when guiding the student through the Practice Activities in Module 5.

Section 1: Pretest

1. a. The ratio of the number of nickels to the number of pennies is $3:5$.
   b. The ratio of the value of the nickels in cents to the value of pennies in cents is $\frac{15}{5}$ or $\frac{3}{1}$.
   c. The ratio of the value of the nickels in cents to the total value in cents is 0.75.

2. **Restaurant A**

   $\frac{29}{32} \doteq 0.9$

   $\frac{\text{Protein}}{\text{Fat}}$

   Restaurant B

   $\frac{26}{31} \doteq 0.8$

   $\frac{\text{Protein}}{\text{Fat}}$

   $0.9 > 0.8$

   So, Restaurant A's hamburgers have the greater ratio of protein to fat.

3. $\frac{2}{7} = \frac{22}{n}$

   $\frac{\text{Gillian's age}}{\text{Grandfather's age}}$

   $2n = 154$

   $n = 77$

   The grandfather is 77 years old.

4. $3 + 2 = 5$

   $\frac{2}{5} = \frac{n}{700}$

   $\frac{\text{Apple juice}}{\text{Cranapple drink}}$

   $1400 = 5n$

   $280 = n$

   To make the cranapple drink, 280 mL of apple juice is used.

5. a. 99 words : 4 min b. $\frac{49 \text{ tires}}{7 \text{ h}}$ or 7 tires/h

6 **Francena**

$\frac{3.99}{12} \div \frac{0.33}{1}$

$\frac{\text{Total cost } (\$)}{\text{Number of oranges}}$

Zoe

$\frac{2.49}{8} \div \frac{0.31}{1}$

$\frac{\text{Total cost } (\$)}{\text{Number of oranges}}$

$0.31/orange < $0.33/orange

So, Zoe received the better deal.

7. $\frac{416}{40} = \frac{x}{15}$

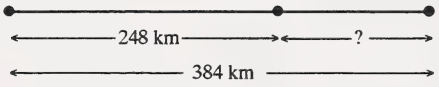
$40x = 6240$

$x = 156$

$\frac{\text{Distance travelled (km)}}{\text{Gas consumed (L)}}$

The car can travel 156 km on 15 L of fuel.

8. Regina Saskatoon Prince Albert



$384 - 248 = 136$

It is 136 km from Saskatoon to Prince Albert.

$\frac{248}{60} = \frac{136}{x}$

$248x = 8160$

$x \doteq 32.9$

$\frac{\text{Distance travelled (km)}}{\text{Gas consumed (L)}}$

The car will consume about 32.9 L travelling from Saskatoon to Prince Albert.

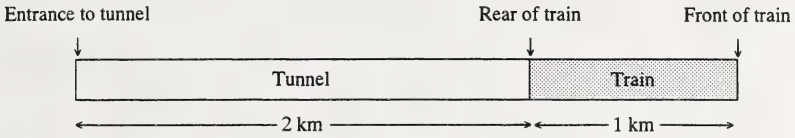
$85 - 60 = 25$

After travelling from Regina to Saskatoon, Krish Naidu has 25 L of gasoline left.

$25 < 32.9$

So, he cannot complete the trip to Prince Albert without refuelling.

9. Train Leaving Tunnel



The train travels 3 km before the rear of the train emerges from the tunnel.

$d = v \times t$

$3 = 30 \times t$

$t = \frac{3}{30}$

$= \frac{1}{10}$

1 h = 60 min

$\frac{1}{10}$ h = 6 min

The train takes $\frac{1}{10}$ h, or 6 min, to travel 3 km.

So, the rear of the train emerges from the tunnel at 1:06 p.m.

10. a. $28 + 13 + 23 + 15 = 79$

$100 - 79 = 21$

There are 21 red stars.

Blue stars	**Gold stars**	**Green stars**	**Silver stars**	**Red stars**
$\frac{28}{100} = 28\%$	$\frac{13}{100} = 13\%$	$\frac{23}{100} = 23\%$	$\frac{15}{100} = 15\%$	$\frac{21}{100} = 21\%$

b. $\frac{13}{23} = \frac{x}{100}$

$1300 = 23x$

$56.5 \doteq x$

$\frac{\text{Gold stars}}{\text{Green stars}}$

The number of gold stars is about 56.5% of the number of green stars.

c. $\frac{28}{15} = \frac{x}{100}$

$2800 = 15x$

$186.7 \doteq x$

$\frac{\text{Gold stars}}{\text{Green stars}}$

The number of blue stars is about 186.7% of the number of silver stars.

11. a. $45\% = \frac{45}{100}$
$= 0.45$

$45\% = \frac{45}{100}$
$= \frac{9}{20}$

b. $9\% = \frac{9}{100}$
$= 0.09$

$9\% = \frac{9}{100}$

c. $12.5\% = \frac{12.5}{100}$
$= \frac{125}{1000}$
$= 0.125$

$12.5\% = \frac{12.5}{100}$
$= \frac{125}{1000}$
$= \frac{1}{8}$

d. $160\% = \frac{160}{100}$
$= 1.6$

$160\% = \frac{160}{100}$
$= \frac{16}{10}$
$= 1\frac{6}{10}$
$= 1\frac{3}{5}$

e. $137\frac{1}{2}\% = 137.5\%$
$= \frac{137.5}{100}$
$= 1.375$

$137\frac{1}{2}\% = \frac{275}{2}\%$
$= \frac{\frac{275}{2}}{100}$
$= \frac{275}{2} \div 100$
$= \frac{275}{2} \times \frac{1}{100}$
$= \frac{275}{200}$
$= 1\frac{75}{200}$
$= 1\frac{3}{8}$

12. a. $0.35 = \frac{35}{100}$
$= 35\%$

b. $0.7 = \frac{7}{10}$
$= \frac{70}{100}$
$= 70\%$

c. $1.62 = \frac{162}{100}$
$= 162\%$

d. $4.2 = \frac{42}{10}$
$= \frac{420}{100}$
$= 420\%$

13. a. $\frac{23}{100} = 23\%$

b. $\frac{3}{10} = \frac{30}{100}$
$= 30\%$

c. $2\frac{3}{20} = \frac{43}{20}$
$= \frac{215}{100}$
$= 215\%$

d. $1\frac{7}{25} = \frac{32}{25}$
$= \frac{128}{100}$
$= 128\%$

14. 30% of $80 = 0.3 \times 80$
$= 24$

She won 24 races.

or

$$\frac{30}{100} = \frac{x}{80}$$
$$2400 = 100x$$
$$24 = x$$

She won 24 races.

15. 20% of the races is 30.
$\downarrow \quad \downarrow \quad \downarrow\downarrow$
$0.2 \quad r \quad = 30$
$r = 150$

The swimmer entered 150 races.

or

$$\frac{20}{100} = \frac{30}{x}$$
$$20x = 3000$$
$$x = 150$$

The swimmer entered 150 races.

16. What percent of 80 is 30?
$\downarrow \quad \downarrow\downarrow\downarrow$
$\frac{x}{100} \times 80 = 30$

$$\frac{80x}{100} = 30$$
$$\frac{4x}{5} = 30$$
$$\frac{\overset{1}{\cancel{5}}}{\underset{1}{\cancel{4}}} \times \frac{\overset{1}{\cancel{4}}x}{\underset{1}{\cancel{5}}} = \frac{5}{\underset{2}{\cancel{4}}} \times \overset{15}{\cancel{30}}$$
$$x = 37.5$$

The baseball team won 37.5% of the games.

or

$$\frac{x}{100} = \frac{30}{80}$$
$$80x = 3000$$
$$x = 37.5$$

The baseball team won 37.5% of the games.

17. 25% of $45.98 = 0.25 \times 45.98$
$\doteq 11.50$

$45.98 - 11.50 = 34.48$

The sale price is \$34.48.

or

$100\% - 25\% = 75\%$

75% of $45.98 = 0.75 \times 45.98$
$\doteq 34.49$

The sale price is \$34.49.

18. 7% of $39.99 = 0.07 \times 39.99$
$\doteq 2.80$

$39.99 + 2.80 = 42.79$

The final price is \$42.79.

or

$100\% + 7\% = 107\%$

107% of $39.99 = 1.07 \times 39.99$
$= 42.79$

The final price is \$42.79.

19. Estimates may vary. Exact answers are given.

a. 40.8 b. 2.2 c. $203\frac{1}{3}$ d. 497.5 e. 88.825

20. Methods for finding the answers will vary. The steps to compute mentally are not necessarily the same as the step to compute using paper and pencil.

a. 0.64 b. 24 c. 30 d. 44

21. a. $I = Prt$
$= 1250 \times 0.08 \times 2$
$= 200$

The interest is \$200.

b. $I = Prt$
$= 800 \times 0.12 \times 0.5$
$= 48$

6 mo = 0.5 a

The interest is \$48.

c. $I = Prt$
$= 3600 \times 0.21 \times 2$
$= 1512$

$1\frac{3}{4}\%/\text{mo} = 21\%/\text{a}$

The interest is \$1512.

22. $\frac{1}{4} = \frac{4.8}{x}$
$x = 19.2$

$\frac{\text{Scale drawing (cm)}}{\text{Actual (m)}}$

The actual length of the store is 19.2 m.

Note: It is recommended that students review the notes and do a few sample questions from the Practice Activities in the sections which correspond to the questions with which they experienced success.

It is recommended that students carefully study the notes and do most of the questions in the Practice Activities in the sections which correspond to the questions with which they experienced difficulties.

Questions	Skills	Sections
1	writing ratios	2
2	comparing ratios	2
3, 4	solving ratio problems	3
5	writing rates	4
6	comparing rates	4
7, 8	solving rate problems	5
9	solving more rate problems	6
10	writing percents	7
11	expressing percents as decimal numbers and fractions	7
12	expressing a decimal number as a percent	7
13	expressing a fraction as a percent	7

Questions	Skills	Sections
14, 15, 16, 17, 18	solving percent problems	8
19	estimating a percent of a number	9
20	mentally computing a percent of a number	9
21	calculating interest	10
22	interpreting scale drawings	11

Module 6: Measurement and Geometry

Gathering Materials

For this module the student will need the following items available from the Learning Resources Distributing Centre.

- Student Module 6: Measurement and Geometry
- Assignment Booklet for Module 6
- optional course audiocassette for Module 6
- required videocassettes for Module 6 (*MATHWAYS: Areas, MATHWAYS: Volumes*)

Students may wish to view the following program if they have access to it.

- Geometric Constructions (International Telecommunications Inc.)

Students may use the following computer programs if they have access to them and an Apple™ or compatible computer.

- *Geometric Concepts: Perimeter* (Jostens Learning Systems)
- *Geometric Concepts: Area* (Jostens Learning Systems)

In addition, the students will need a binder and loose-leaf paper for their responses, tracing paper, heavy paper or light cardboard, glue, a scientific calculator with a $a\frac{b}{c}$ key, and a geometry set (straight edge, ruler, protractor, compass).

Hold the Assignment Booklet for safekeeping until the student is ready for it.

Guiding the Student

Each section of Module 6 deals with a different aspect of measurement and geometry. Parts of Sections 8, 9, and 11 review previously developed skills. The review in Section 1 will review other previously developed skills. The pretest in Section 1 will help you discover the student's strengths and weaknesses and make a personal study plan.

Ensure that the student reads the welcome pages and the module introduction, and does Section 1. Then check the answers to the Pretest (suggested answers follow). Help the student develop a personal study plan and schedule. An average student spends about seven weeks of a 40-week school year on Module 6.

Discuss the evaluation of Module 6 with the student. The assignment for Module 5 is worth 10% of the student's final grade.

Use the guidelines provided at the beginning of this guide to monitor the student's progress and provide encouragement.

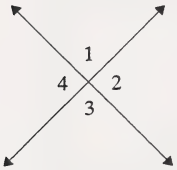
Suggested Answers

Section 1: Pretest

1. a. Complementary angles are two angles with a combined measure of 90°.

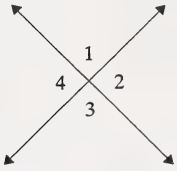
   b. Supplementary angles are two angles with a combined measure of 180°.

   c. Adjacent angles of intersecting lines are the two angles that share a common vertex and a common ray.



∠1 and ∠2 are adjacent angles.
∠1 and ∠4 are adjacent angles.
∠2 and ∠3 are adjacent angles.
∠3 and ∠4 are adjacent angles.

   d. Opposite angles of intersecting lines are the pair of non-adjacent angles formed by the intersecting lines.



∠1 and ∠3 are opposite angles.
∠2 and ∠4 are opposite angles.

2. a. $90 - 38 = 52$
   $k = 52°$

   b. $180 - 150 = 30$
   $n = 30°$

   c. $180 - 71 = 109$
   $t = 109°$

   d. $90 - 80 = 10$
   $p = 10°$

   e. $45 + 58 = 103$
   $180 - 103 = 77$
   $b = 77°$

   f. $90 - 38 = 52$
   $y = 52°$
   $180 - 90 = 90$
   $x = 90°$

   g. $m = 68°$
   $180 - 68 = 112$
   $\ell = 112°$
   $n = 112°$

   h. $x = 70°$
   $180 - 70 = 110$
   $y = 110°$
   $z = 110°$
   $180 - 50 = 130$
   $w = 130°$

3. a. 180° b. 360° c. 540° d. 720° e. 900° f. 1080°

4. a. $90 + 30 = 120$
   $180 - 120 = 60$
   $x = 60°$

   b. $180 - 90 = 90$
   $\frac{1}{2} \times 90 = 45$
   $m = 45°$

   c. $120 + 40 = 160$
   $180 - 160 = 20$
   $d = 20°$

   d. $50 + 60 = 110$
   $180 - 110 = 70$
   $t = 70°$

Isoceles triangles have two congruent angles.

e. $x = 70°$

f. $180 - 60 = 120$

$o = 120°$

g. $n = 45°$

$180 - 45 = 135$

$m = 135°$

$o = 135°$

Opposite angles are congruent.

Adjacent angles are supplementary.

5. a. 4

b. 5

c. 6

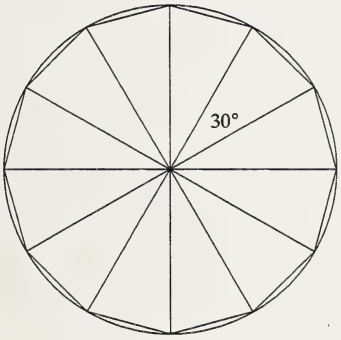
6. a. 5

b. 6

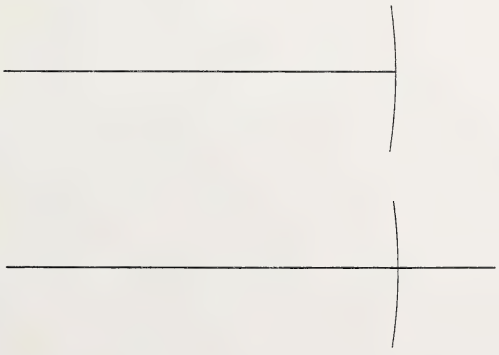
c. 7

7. a. 5 (A regular pentagon will fit onto itself five times in one full turn.)
   b. 6 (A regular hexagon will fit onto itself six times in one full turn.)
   c. 7 (A regular heptagon will fit onto itself seven times in one full turn.)

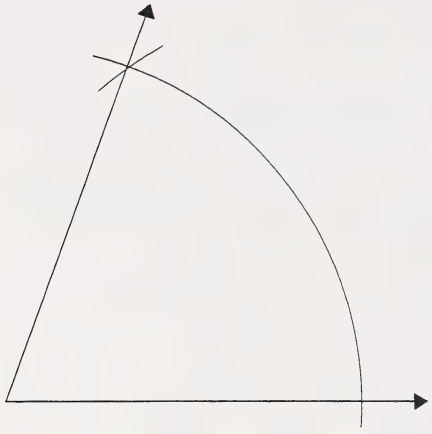
8. $360 \div 12 = 30$

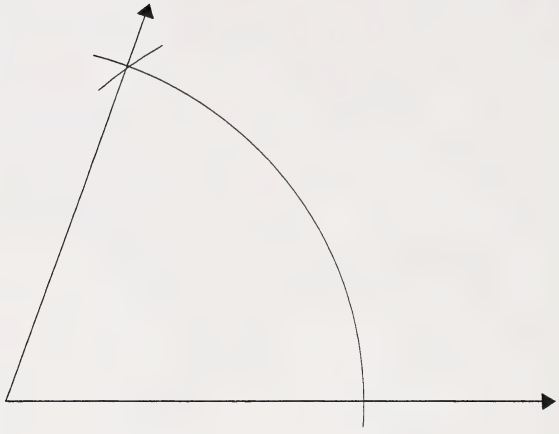


9. a.

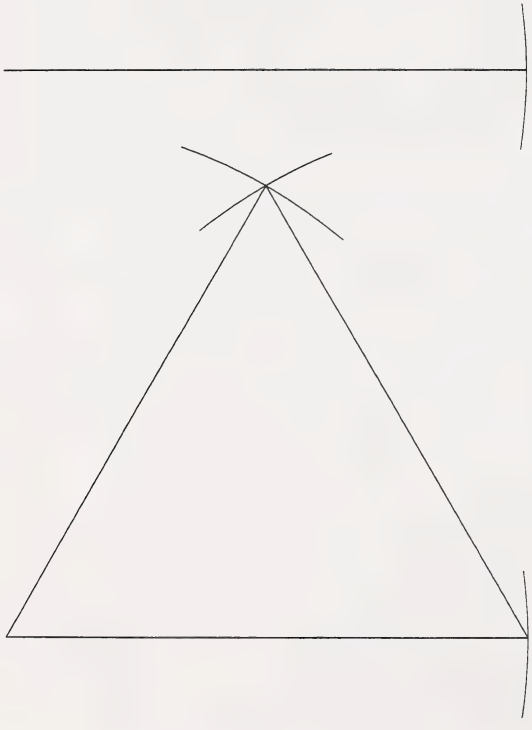


b.

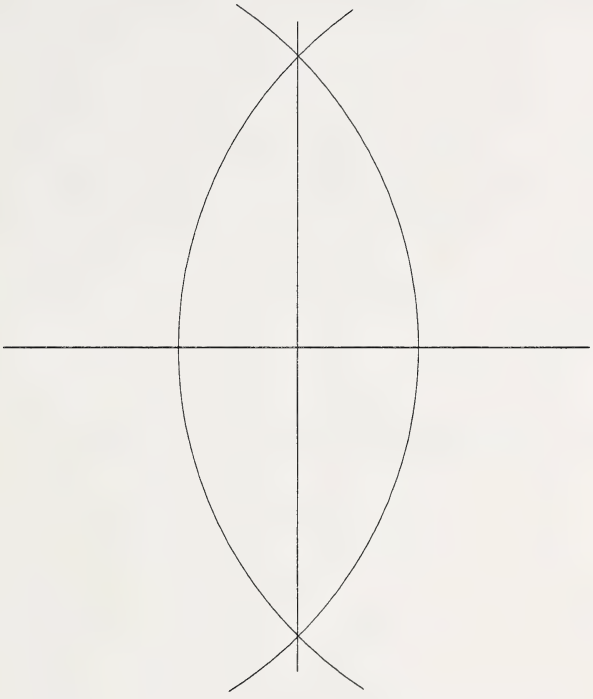




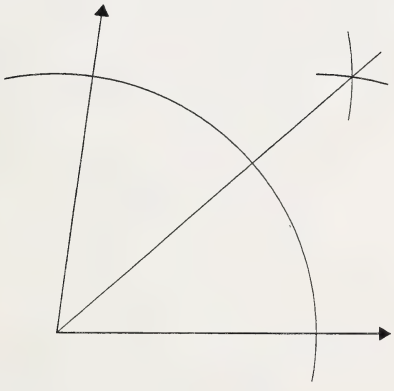
10.



11. a.

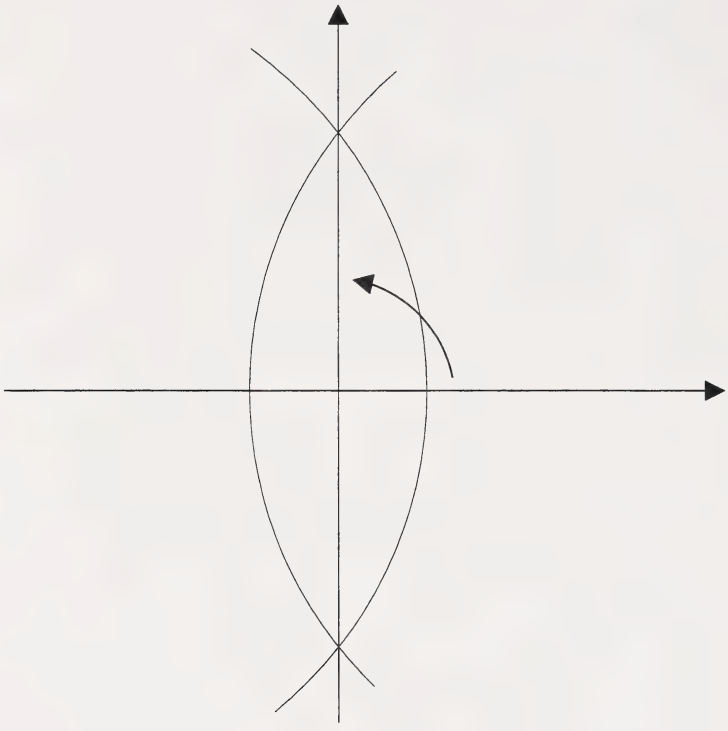


b.

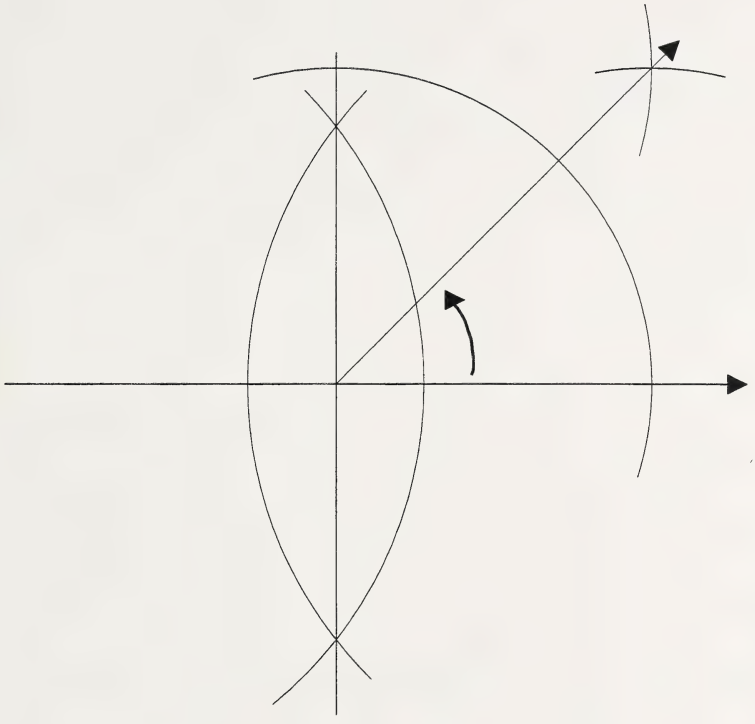


12. There are different methods to construct an angle of 90°. One method is shown.

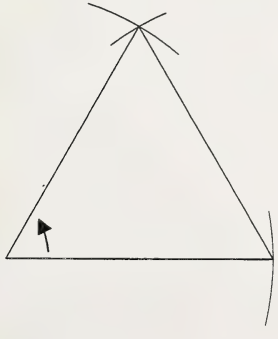
a.



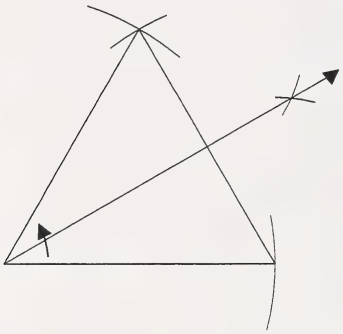
b. Construct an angle of 90° and bisect it.



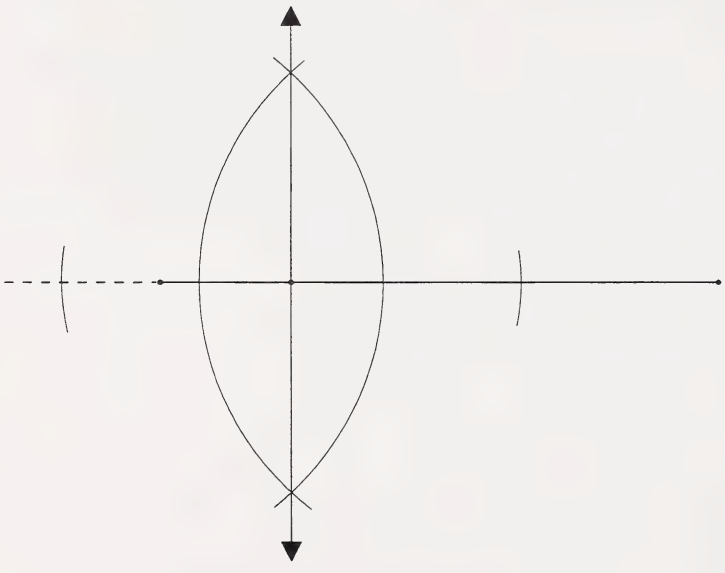
c. Construct an equilateral triangle.



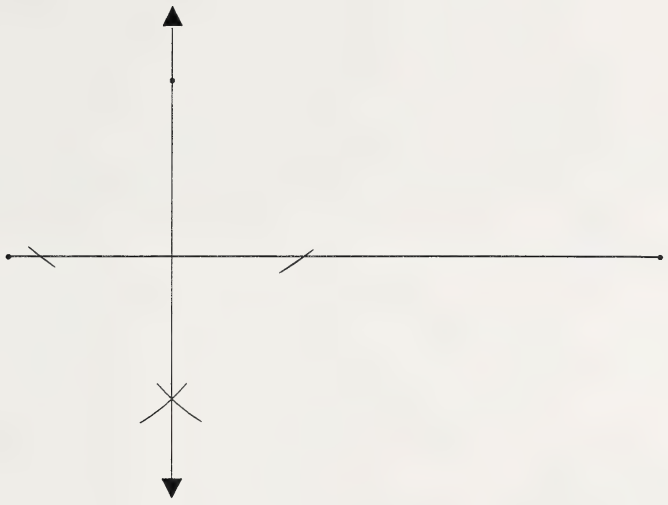
d. Construct an equilateral triangle and bisect one angle.



13. a.



b.



14. a. $P = 2\ell + 2w$
$= 2 \times 9 + 2 \times 5$
$= 18 + 10$
$= 28$

The perimeter is 28 cm.

b. $P = 3s$
$= 3 \times 6.2$
$= 18.6$

The perimeter is 18.6 cm.

c. $P = 2\ell + 2w$
$= 2 \times 10 + 2 \times 8$
$= 20 + 16$
$= 36$

The perimeter is 36 cm.

d. $P = 6 + 6 + 5 + 8$
$= 25$

The perimeter is 25 cm.

15. a. $C = \pi d$
$\doteq 3.14 \times 8$
$\doteq 25.12$

The circumference is about 25.12 cm.

b. $C = \pi d$
$\doteq 3.14 \times 10$
$\doteq 31.4$

The circumference is about 31.4 cm.

16. a. $P = 8 + 5 + 12 + 5 + 20 + 10$
$= 60$

The perimeter is 60 cm.

b. $P = 6 + (2 \times 7) + (2 \times 5) + (2 \times 8) + 12$
$= 6 + 14 + 10 + 16 + 12$
$= 58$

The perimeter is 58 cm.

c. $C = \pi d$
$\doteq 3.14 \times 6$
$\doteq 18.84$

So, the circumference of the semicircle is about 9.42 m.

$P \doteq 9.42 + (2 \times 3) + (2 \times 8) + 12$
$\doteq 9.42 + 6 + 16 + 12$
$\doteq 43.42$

The perimeter is about 43.42 m.

17. This problem can be solved in different ways. An algebraic solution is shown, but students may use the guess-check-revise method.

Let the width be w.
Let the length be $3w + 2$.

$P = 2\ell + 2w$
$92 = 2(3w + 2) + 2w$
$92 = 6w + 4 + 2w$
$92 = 8w + 4$
$-4 \quad\quad -4$
$88 = 8w$
$\frac{1}{8} \times \overset{11}{\cancel{88}} = \frac{1}{\cancel{8}} \times \cancel{8}w$
$w = 11$

The width of the rectangle is 11 m.

If $w = 11$, then

$3w + 2 = 3 \times 11 + 2$
$= 33 + 2$
$= 35$

The length of the rectangle is 35 m.

18. a. $A = b \times h$
$= 12 \times 8$
$= 96$

The area of the rectangle is 96 m^2.

b. $A = b \times h$
$= 8 \times 5$
$= 40$

The area of the parallelogram is 40 cm^2.

c. $A = \frac{b \times h}{2}$
$= \frac{5 \times 14}{2}$
$= \frac{70}{2}$
$= 35$

The area of the triangle is 35 cm^2.

d. $A = \frac{(b_1 + b_2)h}{2}$
$= \frac{(5 + 12) \times 2}{2}$
$= \frac{17 \times 2}{2}$
$= 17$

The area of the trapezoid is 17 cm^2.

e. $A = \frac{n \times s \times a}{2}$
$= \frac{6 \times 5 \times 4.3}{2}$
$= \frac{129}{2}$
$= 64.5$

The area of the regular hexagon is 64.5 cm^2.

19. a. $A = \pi r^2$

$\doteq 3.14 \times 3^2$

$\doteq 3.14 \times 9$

$\doteq 28.26$

The area of the circle is about 28.26 cm^2.

b. $A = \pi r^2$

$\doteq 3.14 \times 7^2$

$\doteq 3.14 \times 49$

$\doteq 153.86$

The area of the circle is about 153.86 mm^2.

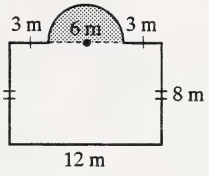
20. a. $A = \pi r^2$

$\doteq 3.14 \times 3^2$

$\doteq 3.14 \times 9$

$\doteq 28.26$

So, the area of the semicircle is about 14.13 m^2.

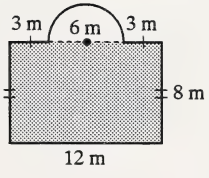


$A = b \times h$

$= 12 \times 8$

$= 96$

The area of the rectangle is 96 m^2.



$14.13 + 96 = 110.13$

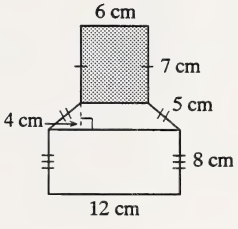
The total area is 110.13 m^2.

b. $A = b \times h$

$= 6 \times 7$

$= 42$

The area of one rectangle is 42 cm^2.

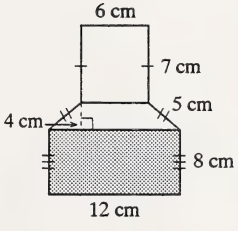


$A = b \times h$

$= 12 \times 8$

$= 96$

The area of the second rectangle is 96 cm^2.



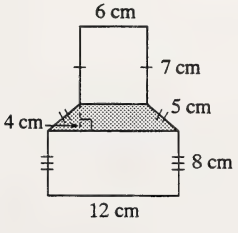
$$A = \frac{(b_1 + b_2)h}{2}$$

$$= \frac{(6+12)4}{2}$$

$$= \frac{72}{2}$$

$= 36$

The area of the trapezoid is 36 cm^2.



$42 + 96 + 36 = 174$

The total area is 174 cm^2.

21. a. $a^2 + b^2 = c^2$

$8^2 + 6^2 = c^2$

$64 + 36 = c^2$

$100 = c^2$

$10 = c$

The missing side is 10 m.

b. $a^2 + b^2 = c^2$

$a^2 + 8^2 = 17^2$

$a^2 + 64 = 289$

$-64 \quad -64$

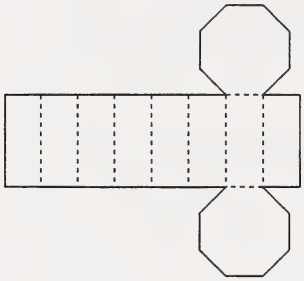
$a^2 = 225$

$a = 15$

The missing side is 15 cm.

22. a. rectangular prism b. triangular prism c. pentagonal prism d. hexagonal prism e. cylinder

23.



24. There are different ways to calculate the surface area. One method is shown.

a. $B = b \times h$

$= 2.5 \times 1.8$

$= 4.5$

The area of the base is 4.5 m^2.

$P = 2\ell + 2w$

$= (2 \times 2.5) + (2 \times 1.8)$

$= 5 + 3.6$

$= 8.6$

The perimeter of the base is 8.6 m.

$SA = 2B + P \times H$

$= (2 \times 4.5) + (8.6 \times 4.1)$

$= 9 + 35.26$

$= 44.26$

The surface area of the rectangular prism is 44.26 m^2.

b. $B = \pi r^2$

$\doteq 3.14 \times (5.5)^2$

$\doteq 3.14 \times 30.25$

$\doteq 95$

The area of the base is about 95 cm^2.

$C = \pi d$

$\doteq 3.14 \times 11$

$\doteq 34.54$

The circumference of the base is about 34.5 cm.

$SA = 2B + C \times H$

$\doteq (2 \times 95) + (34.54 \times 35)$

$\doteq 190 + 1208.9$

$\doteq 1398.9$

The surface area of the cylinder is about 1398.9 cm^2.

c. $B = \frac{b \times h}{2}$

$= \frac{6.6 \times 8}{2}$

$= 26.4$

The area of the base is 26.4 cm^2.

$P = 3 \times 6.6$

$= 19.8$

The perimeter is 19.8 cm.

$SA = 2B + P \times H$

$= (2 \times 26.4) + (19.8 \times 10.7)$

$= 52.8 + 211.86$

$= 264.66$

The surface area of the triangular prism is 264.66 cm^2.

d. $B = \frac{n \times s \times a}{2}$

$= \frac{5 \times 5.5 \times 6.8}{2}$

$= 93.5$

The area of the base is 93.5 m^2.

$P = n \times s$

$= 5 \times 5.5$

$= 27.5$

The perimeter of the base is 27.5 m.

$SA = 2B + P \times H$

$= (2 \times 93.5) + (27.5 \times 15)$

$= 187 + 412.5$

$= 599.5$

The surface area of the pentagonal prism is 599.5 m^2.

25. $B = \pi r^2$

$\doteq 3.14 \times (3.5)^2$

$\doteq 3.14 \times 12.25$

$\doteq 38.465$

The area of the base is about 38.465 cm^2.

$C = \pi d$

$\doteq 3.14 \times 7$

$\doteq 21.98$

The circumference of the base is about 21.98 cm.

$SA = B + C \times H$

$\doteq 38.465 + (21.98 \times 11.5)$

$\doteq 38.465 + 252.77$

$\doteq 291.235$

The surface area of the exterior of the glass is about 291.2 cm^2.

26. a. $B = b \times h$

$= 2.5 \times 1.8$

$= 4.5$

The area of the base is 4.5 m.

$V = B \times H$

$= 4.5 \times 4.1$

$= 18.45$

The volume of the rectangular prism is 18.45 m^3.

b. $B = \pi r^2$

$\doteq 3.14 \times (5.5)^2$

$\doteq 3.14 \times 30.25$

$\doteq 95$

The area of the base is about 95 cm^2.

$V = B \times H$

$\doteq 95 \times 35$

$\doteq 3325$

The volume of the cylinder is about 3325 cm^3.

c. $B = \frac{b \times h}{2}$

$= \frac{6.6 \times 8}{2}$

$= 26.4$

The area of the base is 26.4 cm.

$V = B \times H$

$= 26.4 \times 10.7$

$= 282.48$

The volume of the triangular prism is 282.48 cm^3.

d. $B = \frac{n \times s \times a}{2}$

$= \frac{5 \times 5.5 \times 6.8}{2}$

$= 93.5$

The area of the base is 93.5 m.

$V = B \times H$

$= 93.5 \times 15$

$= 1402.5$

The volume of the pentagonal prism is 1402.5 m^3.

Note: It is recommended that students review the notes and do a few sample questions from the sections which correspond to the questions with which they experienced success.

It is recommended that students carefully study the notes and do most of the questions in the Practice Activities in the sections which correspond to the questions with which they experienced difficulties.

Questions	Skills	Sections
1, 2	interpreting supplementary, complimentary, adjacent, and opposite angles	2
3, 4	determining the sum of the angles in polygons	3
5, 6, 7	recognizing attributes of regular polygons	4
8	constructing a regular polygon using a protractor, straightedge, and compass	4
9	constructing congruent segments and angles	5
10	constructing an equilateral triangle	5
11	bisecting segments and angles	6
12	constructing specific angles	6
13	constructing perpendicular lines	7
14, 15, 16	computing perimeter and circumference	8
17	solving problems involving perimeter	8
18, 19, 20,	calculating area	9
21	using the Pythagorean theorem	10
22	naming prisms and cylinders	11
23	sketching nets of prisms and cylinders	11
24, 25	calculating surface area	12
26	calculating volume	13

Module 7: Data Management

Gathering Materials

In this module the student will need the following items available from the Learning Resources Distributing Centre.

- Student Module 7: Data Management
- Assignment Booklet for Module 7
- optional course audiocassette for Module 7

Students may wish to view one of the following video programs.

- *MATH WORKS: Sampling*
- *SOLVE IT: Sampling*

Students may use the following computer programs if they have access to them and an Apple™ or compatible computer.

- Program 1 "Three Ms" on Disk A of *Mathematics Activities Courseware 8* (Houghton Mifflin)
- Program 15 "Probable Urnings" on Disk C of *Mathematics Activities Courseware 8* (Houghton Mifflin)

In addition, the students will need a binder and loose-leaf paper for their responses, a scientific calculator with a $a\frac{b}{c}$ key, and a geometry set.

Hold the Assignment Booklet for safekeeping until the student is ready for it.

Guiding the Student

Each section of Module 7 deals with a different aspect of data management. Sections 2 and 4 review previously developed skills. The Pretest in Section 1 will help you discover the student's strengths and weaknesses and make a personal study plan.

Ensure that the student reads the welcome pages and the module introduction, and does Section 1. Then check the answers to the Pretest (suggested answers follow). Help the student develop a personal study plan and schedule. An average student spends about three weeks of a 40-week school year on Module 7.

Discuss the evaluation of Module 7 with the student. The assignment for Module 7 is worth 10% of the student's final grade.

Use the guidelines provided at the beginning of this guide to monitor the student's progress and provide encouragement.

Refer to the suggested answers in the Appendix of Student Module 7: Data Management when guiding the student through the Practice Activities in Module 7.

Section 1: Pretest

1. a.

Survey of Grade 9C Students		
Number of Fillings	**Tally**	**Frequency**
0	𝍸	5
1	|||	3
2	||	2
3	|||	3
4	||||	4
5	|	1
6	|||	3
7	||	2
8	||	2

b. $$\frac{(5\times0)+(3\times1)+(2\times2)+(3\times3)+(4\times4)+(1\times5)+(3\times6)+(2\times7)+(2\times8)}{25}=\frac{0+3+4+9+16+5+18+14+16}{25}$$

$$=\frac{85}{25}$$

$$=3.4$$

The mean is 3.4 fillings.

c.

Survey of Grade 9C Students		
Number of Fillings	**Tally**	**Frequency**
0	𝍸	5
1	|||	3
2	||	2
3	|||	3
4	||||	4
5	|	1
6	|||	3
7	||	2
8	||	2

12

←1

Median →

12

The median is 3 fillings.

d.

Survey of Grade 9C Students		
Number of Fillings	**Tally**	**Frequency**
0	𝍸	5
1	|||	3
2	||	2
3	|||	3
4	||||	4
5	|	1
6	|||	3
7	||	2
8	||	2

Mode →

← Most frequent

The mode is 0 fillings.

e. $8 - 0 = 8$

The range is 0 to 8 fillings.

f. 7 out of 25 students have more fillings than Jason.

$$\frac{7}{25} = \frac{28}{100}$$

Jason is in the 28th percentile.

2. a. Chinese b. 400 000 000 c. 100 000 000

3. a. 25 b. 1999 c. $2 000 000

4. a. 8 a.m.
b. 12 noon – 1 p.m.
c. 5 p.m.
d. The driver is probably a taxi driver or salesperson. The driver is driving most of the day.
e. 1 p.m.
f. 35 L
g. 50 L
h. 10 L

5. a. Ontario and British Columbia

b. 18% of $14\,009\,000 = 0.18 \times 14\,009\,000$
$= 2\,521\,620$

In 1951 the population of the prairies was 2 521 620.

c. 18% of $25\,354\,000 = 0.18 \times 25\,354\,000$
$= 4\,563\,720$

In 1986 the population of the prairies was 4 563 720.

6. a. The number of sales of rock compact discs is about nine times the sales of jazz compact discs. However, the picture representing the number of sales of rock compact discs is nine times as high and also nine times as wide as the picture representing the number of sales of jazz compact discs. The pictures are out of proportion. It would be fairer to represent every 100 sales with one picture of a compact disc than to use the different-sized pictures.

b. The profits in June are only $400 more than the profits in January. The profits increased by 5%. However, the title and the slope of the line gives the appearance that profits have soared. The scale on the vertical axis is broken. It would be fairer to use an unbroken scale.

7. a. population: an entire set or group from which data is collected.
b. census: a count or measure of a property of a population
c. sample: a part of a population
d. biased sample: a sample that is not representative of a whole population.
e. random sample: the selection of a sample so that each member of the population has an equal chance of being chosen

8. a. Greta could visit every household in the town and question each family.

b. Greta could get a list of the addresses of all the households from the town office. Then she could select 10% in a random way. She could then visit these sample households and question each family.

9. The second technique is better. The first technique would not give a representative sample of the population. The children getting off the school bus probably live farther away.

10. The second technique would produce more accurate results because about 10% of the population would be polled. The first technique uses too small a sample. The people polled may not be representative of the entire population.

11. $P(Alberta) = \frac{1\,296\,000}{11\,477\,000}$ $P(Alberta) = \frac{1\,296\,000}{11\,477\,000}$ $P(Alberta) = \frac{1\,296\,000}{11\,477\,000}$

$= \frac{1296}{11\,477}$ $\doteq 0.11$ $\doteq 11\%$

The probability is $\frac{1296}{11\,477}$, about 0.11, or about 11%.

12. a. $P(2) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$ $P(2) = \frac{1}{5}$ $P(2) = \frac{1}{5}$

$= \frac{1}{5}$ $= 0.2$ $= \frac{20}{100}$

$= 20\%$

The probability is $\frac{1}{5}$, 0.2, or 20%.

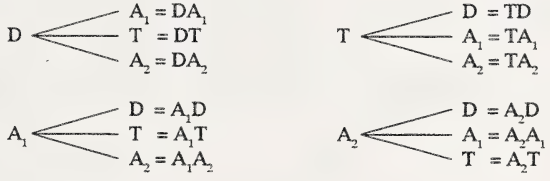
b. $P(\text{even number}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$ $P(\text{even number}) = \frac{2}{5}$ $P(\text{even number}) = \frac{2}{5}$

$= \frac{2}{5}$ $= 0.4$ $= \frac{40}{100}$

$= 40\%$

The probability is $\frac{2}{5}$, 0.4, or 40%.

13. Possible outcomes



a. Favourable outcome: A_1A_2, A_2A_1

$P(\text{two As}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$ $P(\text{two As}) = \frac{2}{12}$ $P(\text{two As}) = \frac{2}{12}$

$= \frac{2}{12}$ $= \frac{1}{6}$ $= \frac{1}{6}$

$= \frac{1}{6}$ $= 0.1\dot{6}$ $= 16\frac{2}{3}\%$

The probability of picking two As is $\frac{1}{6}$, $0.1\dot{6}$, or $16\frac{2}{3}\%$.

b. Favourable outcomes: DT, TD

$$P(\textit{two consonants}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$
$$= \frac{2}{12}$$
$$= \frac{1}{6}$$

$$P(\textit{two consonants}) = \frac{2}{12}$$
$$= \frac{1}{6}$$
$$= 0.16\dot{}$$

$$P(\textit{two consonants}) = \frac{2}{12}$$
$$= \frac{1}{6}$$
$$= 16\frac{2}{3}\%$$

The probability of picking two consonants is $\frac{1}{6}$, $0.16\dot{}$, or $16\frac{2}{3}\%$.

c. Favourable outcomes: DA_1, DA_2, TA_1, TA_2, A_1D, A_1T, A_2D, A_2T

$$P(\textit{a vowel and a consonant}) = \frac{\text{number of favourable outcomes}}{\text{number of possible outcomes}}$$
$$= \frac{8}{12}$$
$$= \frac{2}{3}$$

$$P(\textit{a vowel and a consonant}) = \frac{2}{3}$$
$$= 0.6\dot{}$$

$$P(\textit{a vowel and a consonant}) = \frac{2}{3}$$
$$= 66\frac{2}{3}\%$$

The probability of picking a vowel and a consonant is $\frac{2}{3}$, $0.6\dot{}$, or $66\frac{2}{3}\%$.

Note: It is recommended that the students review and do a few sample questions from the Practice Activities in the sections which correspond to the questions with which they experienced success.

It is recommended that students carefully study the notes and do most of the questions in the Practice Activities in the sections which correspond to the questions with which they experienced difficulties.

Questions	Skills	Sections
1.a.	making a frequency chart	2
1.b.	finding the mean	3
1.c.	finding the median	3
1.d.	finding the mode	3
1.e.	finding the range	3
1. f.	finding the percentile	3
2	interpreting bar graphs	2
3	interpreting pictographs	2
4	interpreting line graphs	2

Questions	Skills	Sections
5	interpreting circle graphs	2
6	recognizing misleading graphs	2
7	interpreting populations, censuses, samples, biased samples, and random samples	4
8.a.	conducting a census	4
8.b.	conducting a sample	4
9, 10	recognizing a biased sample	4
11, 12, 13	finding probability	5

COURSE SURVEY FOR MATHEMATICS 9

Learning Facilitator: Please work with your student to evaluate this course and return this survey when the last module assignment has been completed. This is a course designed in a new distance-learning format, so we are interested in your responses. Your constructive comments will be greatly appreciated so that a future revision may incorporate any necessary improvements.

Name _____ Course _____

Address _____ Age ❑ under 19 ❑ 19 to 40 ❑ over 40

_____ File No. _____

_____ Date _____

Design

1. This course contains a series of Module Booklets. Do you like the idea of separate booklets?

_____

_____

2. Have you ever enrolled in a correspondence course before that arrived as one large volume?

❑ Yes ❑ No If yes, which style do you prefer?

_____

_____

3. The Module Booklets contained a variety of self-assessed activities. Did you find it helpful to be able to check your work and have immediate feedback?

❑ Yes ❑ No If yes, explain.

_____

_____

4. Were the questions and directions easy to understand?

❑ Yes ❑ No If no, explain.

_____

_____

5. The answers for Pretests in the Module Booklets were placed in the Student Support Guide. How well did you work as a team?

   Student's comments: _____

   _____

   _____

   Learning Facilitator's comments: _____

   _____

   _____

6. Did you understand what was expected in the section assignments?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

7. The course materials were designed to be completed by students working independently at a distance. Were you always aware of what you had to do?

   ❑ Yes ❑ No If no, provide details.

   _____

   _____

8. Suggestions for audiocassette, computer programs, and videocassette activities are included in the course. Were you able to use these media options?

   ❑ Yes ❑ No Comment on the lines below.

   _____

   _____

Course Content

1. What is your overall impression of the course? Did it meet your expectations?

   _____

   _____

2. Did you find the work load reasonable?

❑ Yes ❑ No If no, explain.

_____

_____

3. Did you have any difficulty with the reading level?

❑ Yes ❑ No Please comment.

_____

_____

4. How would you assess your general reading level?

❑ poor reader ❑ average reader ❑ good reader

5. Was the material presented clearly and with sufficient depth?

❑ Yes ❑ No If no, explain.

_____

_____

General

1. What did you like least about the course?

_____

_____

2. What did you like most about the course?

_____

_____

Additional Comments

_____

_____

_____

Only students enrolled with the Alberta Distance Learning Centre need to complete the remaining questions.

1. Did you contact Alberta Distance Learning Centre for help or information while doing your course?

   ❑ Yes ❑ No If yes, approximately how many times? _____

   Did you find the staff helpful?

   ❑ Yes ❑ No If no, explain.

   _____

   _____

2. Were you able to fax any of your assignment response pages?

   ❑ Yes ❑ No If yes, comment on the value of being able to do this.

   _____

   _____

3. If you were mailing your assignment response pages, how long was it taking for their return?

   _____

   _____

4. Was the feedback you received from your correspondence teacher helpful?

   ❑ Yes ❑ No Please comment.

   _____

   _____

   _____

   _____

Thanks for taking the time to complete this survey. Your feedback is important to us. Please return this survey with your last module assignment.

Instructional Design and Development Unit
Alberta Distance Learning Centre
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Barrhead, Alberta
T0G 2P0

Mathematics 9

Student Support Guide

L.R.D.C. Producer

1993